WHAT IS CLAIMED IS:

1. A peptide nucleic acid conjugate comprising:

a peptide nucleic acid;

said peptide nucleic acid having a backbone;

said backbone having an amino end, a carboxyl end, and a plurality of amino groups;

said amino groups each having a tethered nucleobase; and a conjugate bound to said peptide nucleic acid either directly or through a linking moiety.

2. A peptide nucleic acid conjugate of claim 1 wherein said conjugate is bound through said linking moiety to at least one of said backbone, said tether, or said nucleobase.

3. A peptide nucleic acid conjugate of claim 1 wherein said conjugate is bound to said backbone.

4. A peptide nucleic acid conjugate of claim 3 wherein said conjugate is bound to at least one of said amino end or said carboxyl end of said backbone.

5. A peptide nucleic acid conjugate of claim 1 wherein said conjugate is bound to said nucleobase or said tether.

Nielsen et al.
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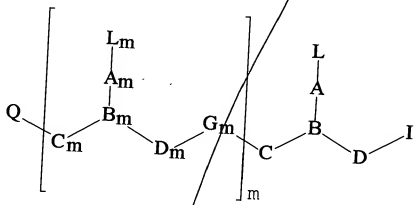
6. A peptide nucleic acid conjugate of claim 1 wherein said conjugate is a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, an aromatic lipophilic molecule, a non aromatic lipophilic molecule, a phospholipid, an intercalator, a cell receptor binding molecule, a crosslinking agent, a water soluble vitamin, a lipid soluble vitamin, an RNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers.

7. A peptide nucleic acid conjugate of the formula:



wherein:

m is an ineteger from 1 to about 50;

L and L_m independently are $R^{12}(R^{13})_a$; wherein:

R^{12} is hydroxy, (C_1-C_4)alkanoyl, a

naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate;

provided that at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, a DNA intercalator, or a nucleobase-binding group;

R^{13} is a conjugate; and

a is 0 or 1;

C and C_m independently are $(CR^6R^7)_y$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4, SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

wherein R^5 is hydrogen, a conjugate, (C_1-C_6)alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C_1-C_6)alkyl; and

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4)alkyl, hydroxy, alkoxy, alkylthio or amino;

D and D_m independently are $(CR^6R^7)_z$;

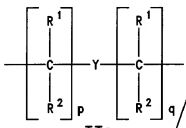
each of y and z is zero or an integer from 1 to 10, wherein the sum y + z is greater than 2 but not more than 10;

G_m is independently $-NR^3CO-$, $-NR^3CS-$, $-NR^3SO-$, or $-NR^3SO_2-$ in either orientation;

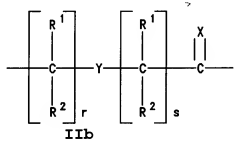
each pair of A-A_m and B-B_m are selected such that:

(a) A or A_m is a group of formula (IIa), (IIb) or (IIc) and B or B_m is N or R^3N^+; or

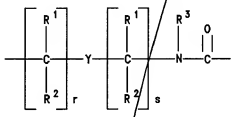
(b) A or A_m is a group of formula (IId) and B or B_m is CH;



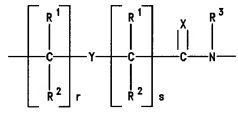
IIa



IIb



IIc



IId

wherein:

X is O, S, Se, NR^3, CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4;

each of p and q is zero or an integer from 1 to 5, the sum p+q being not more than 10;

each of r and s is zero or an integer from 1 to 5, the sum r+s being not more than 10;

R^1 and R^2 independently are hydrogen, (C_1-C_4)alkyl, hydroxy-substituted (C_1-C_4)alkyl, alkoxy-substituted (C_1-C_4)alkyl, alkylthio-substituted (C_1-C_4)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

I is $-NR^8R^9$ or $-NR^{10}C(O)R^{11}$; wherein:

R^8, R^9, R^{10} and R^{11} independently are hydrogen, alkyl, an amino protecting group, a reporter ligand, an intercalator, a chelator, a peptide, a protein, a carbohydrate, a lipid, a steroid, a nucleoside, a nucleotide, a nucleotide diphosphate, a nucleotide triphosphate, an oligonucleotide, an oligonucleoside, a soluble polymer, a non-soluble polymer or a conjugate;

Q is $-CO_2H$, $-CO_2R^8$, $-CO_2R^9$, $-CONR^8R^9$, $-SO_3H$, $-SO_2NR^{10}R^{11}$ or an activated derivative of $-CO_2H$ or $-SO_3H$; and

wherein at least one of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12} and R^{13} is a conjugate wherein said conjugate is a reporter enzyme, a reporter molecule, a steroid, a

carbohydrate, a terpene, a peptide, a protein, an aromatic lipophilic molecule, a non aromatic lipophilic molecule, a phospholipid, an intercalator, a cell receptor binding molecule, a crosslinking agent, a water soluble vitamin, a lipid soluble vitamin, an RNA cleaving complex, a metal chelator, a porphyrin an alkylator, or a polymeric compound selected from polymeric amines, a polymeric glycols and polyethers; and

wherein said conjugate optionally includes a linking moiety.

8. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein said conjugate includes a linking moiety.

9. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein at least one group R^{12} is a conjugate.

10. A peptide nucleic acid conjugate of claim 7 wherein at least one group R^{13} is a conjugate.

11. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein at least one of R^1, R^2 or R^3 is a conjugate.

12. A peptide nucleic acid conjugate of claim ~~11~~ 39 wherein at least one of said A-A_m groups include at least one of R^1, R^2, and R^3.

13. A peptide nucleic acid conjugate of claim ~~11~~ 39 wherein at least one of said B-B_m groups or said G-G_m groups include at least one group R^3.

14. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein at least one of R^8, R^9, R^{10} and R^{11} is a conjugate.

15. A peptide nucleic acid conjugate of claim ~~11~~ 37 wherein at least one of said groups Q or I include at least one of groups R^8, R^9, R^{10} and R^{11}.

16. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein at least one of R^3 R^4, R^5, R^6 and R^7 is a conjugate.

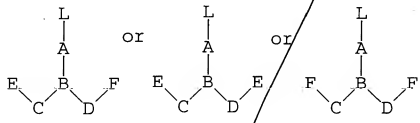
17. A peptide nucleic acid conjugate of claim 16 wherein at least one of said groups D-D_m, or C-C_m include at least one of R^3, R^4, R^5, R^6 and R^7.

18. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein m is from 1 to about 200.

19. A peptide nucleic acid conjugate of claim ~~1~~ 37 wherein m is from 1 to about 50.

20. A peptide nucleic acid conjugate of claim ~~7~~ 87 wherein m is from 1 to about 20.

21. A compound having one of the following formulas:



wherein:

L is $R^{12}(R^{13})_a$; wherein:

R^{12} is hydrogen, hydroxy, (C_1-C_4)alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, a DNA intercalator, or a nucleobase-binding group;

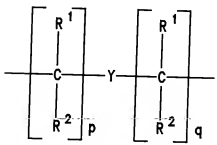
R^{13} is a conjugate; and

a is 0 or 1;

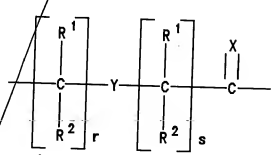
A and B are selected such that:

(a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+; or

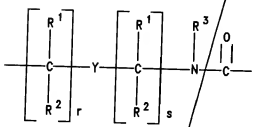
(b) A is a group of formula (IId) and B is CH;



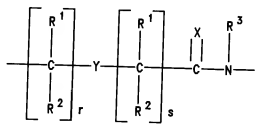
IIa



IIb



IIc



IId

where:

X is O, S, Se, NR^3, CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4;

p and q independently are zero or an integer from 1 to 5, the sum p+q being not more than 10;

r and s independently are zero or an integer from 1 to 5, the sum r+s being not more than 10;

R^1 and R^2 independently are hydrogen, (C_1-C_4)alkyl,

hydroxy-substituted (C_1-C_4)alkyl, alkoxy-substituted (C_1-C_4)alkyl, alkylthio-substituted (C_1-C_4)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is $(CR^6R^7)_y$;

D is $(CR^6R^7)_z$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4)alkyl, hydroxy, alkoxy, alkylthio or amino; and

R^5 is hydrogen, a conjugate, (C_1-C_6)alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C_1-C_6)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

E independently is COOH, CSOH, SOOH, SO_2OH or an activated or protected derivative thereof;

F independently is NHR^3 or $NPgR^3$, where Pg is an amino protecting group; and

at least one of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^{12}, and R^{13} is a conjugate wherein said conjugate is a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, an aromatic lipophilic molecule, a non aromatic lipophilic molecule, a phospholipid, an intercalator, a cell receptor binding molecule, a crosslinking agent, a water soluble vitamin, a lipid soluble vitamin, an RNA cleaving complex, a metal chelator, a porphyrin an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and wherein said conjugate optionally inlcludes a linking moiety.

22. A peptide nucleic acid conjugate of claim 21 wherein said conjugate includes a linking moiety.

23. A peptide nucleic acid conjugate of claim 21 wherein R^{12} is a conjugate.

24. A peptide nucleic acid conjugate of claim 21 wherein R^{13} is a conjugate.

25. A peptide nucleic acid conjugate of claim 21 wherein at least one group R^3 is a conjugate.

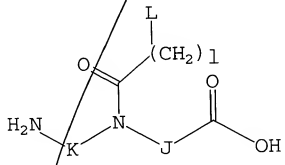
26. A peptide nucleic acid conjugate of claim 21 wherein at least one of said groups A or said groups B include a conjugate.

27. A peptide nucleic acid conjugate of claim 21 wherein at least one of group R^1 or group R^2 is a conjugate.

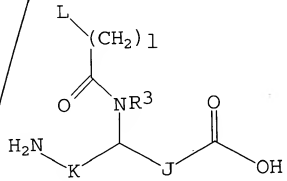
28. A peptide nucleic acid conjugate of claim 21 wherein at least one of R^3, R^4, R^5, R^6, and R^7 is a conjugate.

29. A peptide nucleic acid conjugate of claim 21 wherein at least one of said groups C or said groups D include a conjugate.

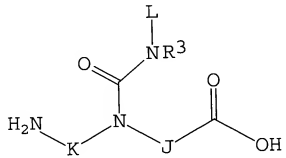
30. A peptide nucleic acid conjugate comprising a plurality of PNA monomers wherein at least one of said PNA monomers has the formula:



or formula:



or formula:



wherein:

L is $R^{12}(R^{13})_a$; wherein:

R^{12} is hydrogen, hydroxy, (C_1-C_4)alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, a DNA intercalator, or a nucleobase-binding group;

R^{13} is a conjugate; and

a is 0 or 1;

K is $(CR^6R^7)_z$;

J is $(CR^6R^7)_y$; wherein:

R^6 and R^7 are independently hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4)alkyl, hydroxy, alkoxy, alkylthio or amino;

R^5 is hydrogen, a conjugate, (C_1-C_6)alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C_1-C_6)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

l is an integer from 1 to 5; and

at least one of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^{12}, and R^{13} is a conjugate wherein said conjugate is a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, an aromatic lipophilic molecule, a non aromatic lipophilic molecule, a phospholipid, an

intercalator, a cell receptor binding molecule, a crosslinking agent, a water soluble vitamin, a lipid soluble vitamin, an RNA cleaving complex, a metal chelator, a porphyrin an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and wherein said conjugate optionally includes a linking moiety.

31. A peptide nucleic acid conjugate of claim 30 wherein said conjugate includes a linking moiety.

32. A peptide nucleic acid conjugate of claim 30 wherein ~~R^{12} is a conjugate~~.

33. A peptide nucleic acid conjugate of claim 30 wherein R^{13} is a conjugate.

34. A peptide nucleic acid conjugate of claim 30 wherein at least one of R^3, R^4, R^5, R^6, and R^7 is a conjugate.

35. A peptide nucleic acid conjugate of claim 30 wherein at least one of said group K or said group J includes a conjugate.

36. A peptide nucleic acid conjugate of claim 30 wherein said group R^3 is a conjugate.